

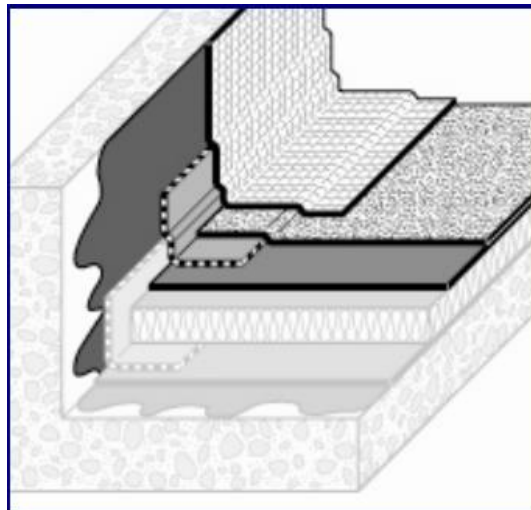
# Environmental Product Declaration

## Bitumen impermeability system – 2-layer

*Collective declaration*

*In conformance with the norms NF EN ISO 14025, NF EN 15804+A1 and the French national complement NF EN 15804/CN*

August 2017



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Produced by:  
EVEA

Le Sillon 8, avenue des Thébaudières 44800 Saint-Herblain

Tél. + 33 (0)9 63 48 50 16 - Fax. + 33 (0)2 40 71 97 41

[www.evea-conseil.com](http://www.evea-conseil.com)

## Attention

The information contained in this declaration is provided under the responsibility of the CSFE (owner of this EPD) according to the NF EN 15804+A1 and the French national complement XP P01-064/CN.

Any exploitation, total or partial, of the information provided in this document should at least be accompanied by a reference to the complete original EPD as well as to the owner of the declaration who can provide a copy of the full EPD.

It is reminded that the results of this study are based purely on facts, scenarios and hypotheses which have been provided for this study. If any of these facts, scenarios or hypotheses should change, the results of this study are also liable to change.

Additionally, the results of this study should be considered in their entirety, with the appropriate hypotheses, and not taken individually.

The Chambre Syndicale Française de l'Étanchéité (CSFE) accepts no responsibility for any third party having received the results of this study or to whom they have been communicated; the use of the results of this study by a third party is entirely their own responsibility.

The norm EN 15804+A1 and the national complement NF EN 15804/CN of the CEN serve as the Product Category Rules (PCR) for this study.

## Reading Guide

The inventory data respects the requirements of the norm EN 15804+A1.  
In the following tables, 2.53E-06 should be read as  $2.53 \times 10^{-6}$  (scientific notation).

The units used are specified for each flow, and are as follows:

- kilogram « kg »,
- gram « g »,
- liter « l »,
- kilowatt-hour « kWh »,
- mega joule « MJ ».

Abbreviations:

- LCA: Life Cycle Analysis
- RSL: Reference Service Life
- FU: Functional Unit
- LHV: Lower Heating Value

## Warning concerning the use of EPDs in the comparison of products

EPDs for construction products created in conformance with the norm EN 15804+A1 should only be compared with EPDs likewise created in conformance with the same norm.

The norm EN 15804+A1 specifies in chapter 5.3, "Comparability of EPD for construction products", the conditions under which construction products may be compared, based on information provided in the EPD:

*"In principle the comparison of products on the basis of their EPD is defined by the contribution they make to the environmental performance of the building. Consequently, comparison of the environmental performance of construction products using the EPD information shall be based on the product's use in and its impacts on the building, and shall consider the complete life cycle (all information modules)."*

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# 1 INTRODUCTION

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The format used to present this environmental product declaration is based on the French national complement NF EN 15804/CN.

This document provides a model adapted for the presentation of the environmental characteristics of construction products in conformance with the requirements of the norm NF EN 15804+A1, the French national complement NF EN 15804/CN. It also provides comments and supplementary information to demonstrate the respect of the spirit of the norm in terms of sincerity and transparency.

The information contained in this document has been provided by the companies AXTER, DERBIGUM, MEPLE, SIPLAST-ICOPAL, SOPREMA, members of the CSFE.

CSFE contact:

Lise Bousserl

Contact details:

[bousserl@csfe.ffbatiment.fr](mailto:bousserl@csfe.ffbatiment.fr)

01 56 62 13 27

## 2 GENERAL INFORMATION

1. Declarant name and address:

**Chambre Syndicale Française de l'Étanchéité (CSFE)**  
**6 Rue la Pérouse**  
**75016 Paris**  
**FRANCE**

2. Manufacturing sites for which the EPD is representative:

**AXTER** : Courchelettes (France, 59)  
**DERBIGUM** : Perwez (Belgium, 1360)  
**MEPLE** : Tourville La Rivière (France, 76)  
**SIPLAST-ICOPAL** : Cormenon (France, 41) ; Lorient-sur-Drôme (France, 26)  
**SOPREMA** : Strasbourg (France, 67), Val de Reuil (France, 27), Sorgues (France, 84)

3. Type of EPD: "cradle to grave".

4. Type of EPD: collective.

Conditions of use:

The rules characterizing the inclusion of commercial references in the project have been determined in conformity with the sensitivity analysis methodology defined in appendix L of the French national complement NF EN 15804/CN. The homogenous nature of the impacts of this type of product allows the declaration of an average product. The declared values therefore correspond to a fictitious average product. This typical product is defined by calculating a mathematical average of each of the parameters comprising the sampled products.

The min/max values of the sensitive parameters can be seen in the following table:

Sensitive parameter	Unit	Min	Max	Declared average
Mass	kg/m <sup>2</sup>	6.40E+00	8.90E+00	7.66E+00
Bitumen	kg/kg of product	3.33E-01	5.16E-01	4.30E-01
Polyester (reinforcement)	kg/kg of product	0.00E+00	7.45E-02	2.76E-02
Polymer	kg/kg of product	2.05E-02	9.28E-02	5.31E-02
Grid electricity FR	kWh/kg of product	0.00E+00	1.39E+00	7.31E-02
Natural gas consumption during production	kWh/kg of product	5.70E-03	3.81E-01	2.18E-01
Installation losses	%	-	-	3.00E+00*
Overlap	%	6.00E+00	1.01E+01	7.53E+00

\* Retained value based on expert opinion

The commercial references which may be included in this EPD must respect the minimal and maximal values cited in the preceding table.

The companies authorized to use this EPD are listed in chapter 2.2.


5. Publication date: August 2017.

6. Valid until: August 2022.

7. Commercial reference/product ID:

The list of commercial references and products covered by this EPD is available on demand from the CSFE.

8. Verification:

<b>The norm EN 15804+A1 and the French national complement NF EN 15804/CN of the CEN serves as PCR a).</b>	
Independent verification of the declaration, in conformity with EN ISO 14025:2010 b)	
<input type="checkbox"/> internal <input checked="" type="checkbox"/> external	
<b>Verification :</b> 	<i>Name of reviewer:</i> Anis GHOUMIDH (Engineeria) <i>Verification program:</i> AFNOR FDES-INIES <i>Address :</i> Association HQE. 4, avenue du Recteur Poincaré - 75016 Paris. <i>Website:</i> <a href="http://www.inies.fr/accueil/">http://www.inies.fr/accueil/</a>
a) Product Category Rules b) Facultative for communication between companies, obligatory for communication between companies and their clients (see EN ISO 14025:2010, 9.4).	

### 3 PRODUCT DESCRIPTION AND FUNCTIONAL UNIT

9. Description of the functional unit:

“Assure the impermeability of 1m<sup>2</sup> of roof via a 2-layered bitumen-polymer membrane according to the performance levels described by the norm EN 13707 and installed according to the industry standards\*\*”

\* In conformity with DTU 43.1, 43.3, 43.4 & 43.5.

10. Product description: the products are 2-layer bitumen-polymer membranes which are seam-welded together. The thickness of the system varies from 5 to 6.5mm.

11. Description of the product's use (area of application): the products are installed in the building to ensure the impermeability to water of the roof. They may be installed on a variety of supports: wood, concrete and steel. For further information consult the product's DTA.

12. Other technical characteristics not included in the functional unit: the products covered by this EPD possess numerous technical characteristics such as tear resistance, tensile strength, shock resistance etc. These characteristics may be found in the technical data sheets of each product which are available online.

13. Description of the principle components and materials of the product:

Parameter	Units	Value
<b>FU equivalent quantity of the product</b>	kg/m <sup>2</sup>	7.66
<b>Principle components</b>	-	The product is composed primarily of bitumen, polymer, polyester and/or fiberglass (reinforcement) and filler (sand, slate chips). For products designed for use on roof terraces/gardens, an anti-root product is added. For products requiring fire protection, a fire retardant may be added.
<b>Complementary products</b>	-	The flashing and bitumen primer are only applied around the edges (vertical and horizontal) of the surface to be covered. As such the quantity of these complementary products is calculated on the basis of the quantity necessary for a roof of total surface 1000m <sup>2</sup> (40 x 25m), inclined at <5%, divided by 1000 to provide a value per m <sup>2</sup> . The width of the flashing strip is 30cm and the flashing bracket is 25cm.

Flashing	kg/m <sup>2</sup>	3.90E-02
Flashing bracket	kg/m <sup>2</sup>	3.25E-02
Separation layer (for use under heavy protection)	kg/m <sup>2</sup>	1.25E-02
Bitumen primer	kg/m <sup>2</sup>	8.77E-03
<b>Distribution packaging</b>	-	The products are rolled on a cardboard core and enclosed in either paper or adhesive bands of PP. The rolls are then placed on a pallet which is wrapped in a plastic film.
Wooden pallet	kg/m <sup>2</sup>	1.76E-01
Cardboard	kg/m <sup>2</sup>	3.44E-02
Polyethylene film (PE)	kg/m <sup>2</sup>	8.04E-03
Polypropylene adhesive band (PP)	kg/m <sup>2</sup>	2.81E-03
Paper	kg/m <sup>2</sup>	6.97E-03
Installation losses	%	3%
Maintenance losses	%	N/A.
Justification of the supplied information	-	All information is provided by the companies of the CSFE

14. Specify if the product contains substances featured on the Candidate List from the REACH regulations (if greater than 0.1% by mass of the total product):

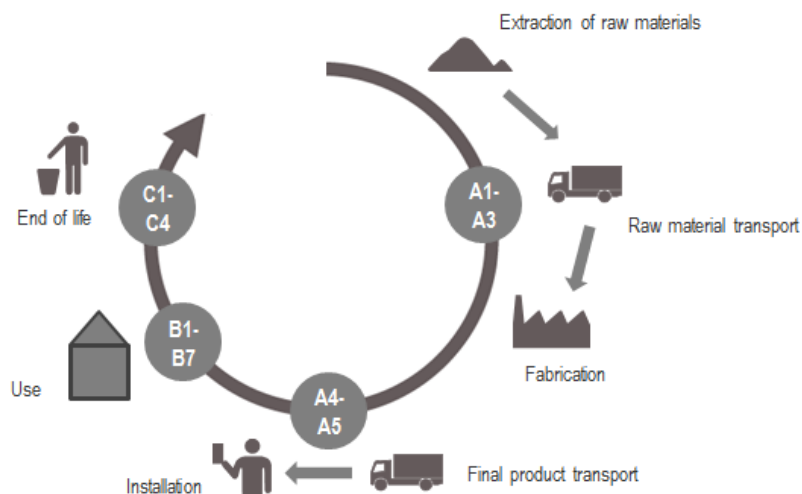
The products contain no substances featured on the Candidate List from the REACH regulations greater than 0.1% by mass of the total product.

15. Description of the Reference Service Life (if applicable and in conformance with §7.2.2 of the NF EN 15804+A1)

Parameter	Unit	Value
Reference Service Life	Years	30
Declared properties of the product (at exit of the factory)	-	The declared properties of the products are described in their Declaration of Performance (DOP) in conformance with the norm EN 13707.
Theoretical parameters	-	In conformance with the norm NF EN 13707.
Assumed quality of work	-	The quality of work is assumed to be in accordance with the recommendations of the DTA of the products as well as DTU 43.1.
Exterior environment	-	The characteristics of the products concerning the exterior environment are described in their Declaration of Performance (DOP) in conformance with the norm EN 13707.
Interior environment	-	The products are not in contact with the interior environment of the building. Further detail concerning the volatile emissions of the product can be found in chapter 7 of this document.
Conditions of use	-	The use of this product is assumed to be in accordance with the recommendations of the manufacturer, please consult the Technical Data Sheets.
Maintenance	-	No maintenance is expected during the RSL of the products.

## 4 LIFE CYCLE STAGES

Diagram of the product life-cycle:



### 4.1 Production stages, A1-A3

The modules A1 to A3 include all of the processes from the extraction of raw materials up to their transformation into the finished product.

### 4.2 Construction stages, A4-A5

**Transport to installation site:**

Parameter	Unit	Value/Description
Type of fuel and vehicle consumption or type of vehicle	-	The vehicles considered are Euro 4 trucks with a useful load of 16-32 tons.
Distance to installation site	km	355
Capacity used	%	36% (generic value based onecoinvent data)
Volumetric mass of transported product	kg/m <sup>3</sup>	1100 to 1700
Volumetric capacity utilization coefficient	-	> 14 %
Scenario description	-	The product is delivered by truck from the production factory to the client. The transport distance is averaged and weighted according to the volume of sales to the different regions to which the product was distributed in 2015.

**Installation in the building:**

Parameter	Unit	Value/Description
Scenario	-	<p>The impermeability systems can be installed in 4 different ways:</p> <ul style="list-style-type: none"> <li>- Propane gas welding</li> <li>- Mechanical fixing</li> <li>- Self-adhesive</li> <li>- Independently under heavy protection (roof terrace, vegetated roof etc.)</li> </ul> <p>The second layer of the 2-layer system is propane gas-welded to the first layer.</p> <p>This EPD considers an average of the 4 installation methods, (mathematical average of the required components for each method). The following values are the result of this calculation.</p>



		The products are unrolled side-by-side and to guarantee the impermeability each roll overlaps the next by 7 to 15% of the surface. This overlap is considered as a loss of product.
Average coverage	%	7.53
Product losses	%	3
<b>Installation auxiliary inputs</b>	-	-
Propane gas (all installations) + welding of the second layer	kg/m <sup>2</sup>	4.12E-01
Steel screws	kg/m <sup>2</sup>	5.00E-02
<b>Waste and emissions</b>	-	The packaging is partly recycled and the rest is sent to landfill and incineration according the data provided by the ADEME <sup>1</sup> . The hypothesis retained for the transport distances is as follows: <ul style="list-style-type: none"> <li>- 30km for non-hazardous waste</li> <li>- 100km for hazardous waste</li> <li>- 100km for recycling</li> </ul> The waste product is considered as hazardous waste for incineration.
Waste product (losses and overlap)	kg/m <sup>2</sup>	8.05E-01
Waste wooden pallet	kg/m <sup>2</sup>	1.76E-01
Waste cardboard	kg/m <sup>2</sup>	3.44E-02
Waste polyethylene film (PE)	kg/m <sup>2</sup>	8.04E-03
Waste polypropylene adhesive band (PP)	kg/m <sup>2</sup>	2.81E-03
Waste paper	kg/m <sup>2</sup>	6.97E-03
Direct emissions to ambient air – CO <sub>2</sub> (due to propane combustion)	kg/m <sup>2</sup>	1.24E+00

### 4.3 Use stage, B1-B7

#### **B1 Use:**

No value for emissions could be obtained during the data collection.

#### **B2 Maintenance:**

No maintenance is deemed necessary during the Reference Service Life selected.

#### **B3 Repair:**

No repair is deemed necessary during the Reference Service Life selected.

#### **B4 Replacement:**

No replacement is deemed necessary during the Reference Service Life selected.

#### **B5 Refurbishment:**

No refurbishment is deemed necessary during the Reference Service Life selected.

#### **B6 – B7 Use of energy and water:**

No energy or water consumption is deemed necessary during the Reference Service Life selected.

<sup>1</sup> Emballages industriels, commerciaux et ménagers (ADEME, 2011) | Déchets chiffres clés (ADEME, 2012)



#### 4.4 End of life stage C1-C4

Parameter	Unit	Value/description
Quantity collected separately	kg/m <sup>2</sup>	Product: 7.66 Complementary products: 0.0928
Quantity collected with mixed construction waste	kg	-
Quantity destined for re-use	kg	-
Quantity destined for recycling	kg	-
Quantity destined for energy recovery	kg	-
Quantity of product destined for elimination	kg/m <sup>2</sup>	7.75
Scenario description	-	The product and the complementary products are considered as being removed by hand and sent to landfill as non-hazardous waste. The transport of the end-of-life waste is carried out by Euro 4 trucks with a useful load of 16-32T. A distance of 30km has been considered.

#### 4.5 Potential for recycling/re-use/recovery, D

The module D has not been taken into account for this study

## 5 INFORMATION FOR THE LIFE CYCLE ANALYSIS CALCULATION

<b>PCR used</b>	NF EN 15804+A1 (August 2014) and the French national complement NF EN 15804/CN (June 2016).
<b>System limits</b>	The limits of the system respect the requirements of the norm NF EN 15804+A1 and the French national complement NF EN 15804/CN.
<b>Allocations</b>	The allocation of the data for an industrial site to a product depends on each manufacturer. It may be based on mass (kg) or surface (m <sup>2</sup> ) produced.
<b>Geographical and temporal representation of the primary data</b>	<p>Generic data is provided by the ecoinvent 3.2 « allocation recycled content » database, perimeter Europe.            Manufacturer data is based on a collect performed for the year 2015.            Software used:</p> <p> - SimaPro, Life Cycle Analysis tool (V8.3).</p> <p> - Ev-DEC, (<a href="http://www.ev-dec.com">www.ev-dec.com</a>), developed by the consultancy company EVEA (<a href="http://www.evea-conseil.com">www.evea-conseil.com</a>), which aids in the creation of EPDs.</p>
<b>Variability of the results</b>	The sensitivity analysis performed for the validity scope demonstrates that the impacts of the collected products are inferior to 1.4 times the declared average impacts provided in this EPD.

## 6 LIFE CYCLE ANALYSIS RESULTS

Environmental Impacts	Fabrication stage			Installation stage		Use stage							End of Life stage				D Benefits and impacts beyond the system limits
	A1 Raw material supply	A2 Transport	A3 Fabrication	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Use of energy	B7 Use of water	C1 Deconstruction/ demolition	C2 Transport	C3 Waste treatment	C4 Elimination	
<b>Global Warming Potential (GWP)</b> kg CO <sub>2</sub> eq/FU	3.62E+00	3.30E-01	9.26E-01	4.71E-01	2.83E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.38E-03	0.00E+00	9.55E-01	N/A
<b>Depletion potential of the stratospheric ozone layer, (ODP)</b> kg CFC 11 eq/FU	2.49E-06	6.03E-08	1.30E-07	8.67E-08	6.05E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.55E-10	0.00E+00	2.30E-08	N/A
<b>Acidification Potential of soil and water (AP)</b> kg SO <sub>2</sub> eq/FU	2.61E-02	1.59E-03	2.86E-03	1.87E-03	7.52E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E-06	0.00E+00	1.13E-03	N/A
<b>Eutrophication Potential (EP)</b> kg (PO <sub>4</sub> ) <sup>3-</sup> eq/FU	2.73E-03	2.46E-04	4.26E-04	3.26E-04	9.00E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.57E-07	0.00E+00	5.20E-04	N/A
<b>Formation potential of tropospheric ozone (POCP)</b> Ethene eq/FU	4.48E-03	1.56E-04	5.38E-04	2.09E-04	1.09E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.13E-07	0.00E+00	2.60E-04	N/A
<b>Abiotic depletion potential – non-fossil (ADP-elements)</b> kg Sb eq/FU	2.15E-05	9.49E-07	1.89E-06	1.42E-06	3.31E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.17E-09	0.00E+00	1.28E-07	N/A
<b>Abiotic depletion potential – fossil (ADP-fossil fuels)</b> MJ PCI/FU	2.36E+02	5.01E+00	1.41E+01	7.18E+00	5.14E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.11E-02	0.00E+00	2.14E+00	N/A
<b>Water Pollution</b> m <sup>3</sup> /FU	4.90E+00	1.22E-01	7.59E-01	1.74E-01	1.33E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.12E-04	0.00E+00	1.03E-01	N/A
<b>Air Pollution</b> m <sup>3</sup> /FU	3.60E+02	4.38E+01	6.18E+02	6.20E+01	2.06E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.82E-01	0.00E+00	1.44E+01	N/A

Resource use	Fabrication stage			Installation stage		Use stage							End of Life stage				D Benefits and impacts beyond the system limits
	A1 Raw material supply	A2 Transport	A3 Fabrication	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Use of energy	B7 Use of water	C1 Deconstruction/ demolition	C2 Transport	C3 Waste treatment	C4 Elimination	
Use of renewable primary energy excluding the renewable primary energy resources used as raw materials MJ PCI/FU	1.85E+00	6.58E-02	4.25E+00	9.36E-02	1.27E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.75E-04	0.00E+00	7.43E-02	N/A
Use of renewable primary energy resources used as raw materials MJ PCI/FU	5.57E-02	0.00E+00	3.45E+00	0.00E+00	-1.04E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials) MJ PCI/FU	1.90E+00	6.58E-02	7.70E+00	9.36E-02	2.37E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.75E-04	0.00E+00	7.43E-02	N/A
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials MJ PCI/FU	6.93E+01	5.11E+00	1.94E+01	7.31E+00	3.50E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.15E-02	0.00E+00	2.26E+00	N/A
Use of non-renewable primary energy resources used as raw materials MJ PCI/FU	1.74E+02	0.00E+00	1.58E+00	0.00E+00	1.84E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials) MJ PCI/FU	2.44E+02	5.11E+00	2.10E+01	7.31E+00	5.35E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.15E-02	0.00E+00	2.26E+00	N/A
Use of secondary materials kg/FU	2.76E-02	0.00E+00	2.66E-02	0.00E+00	5.72E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A
Use of renewable secondary fuels MJ PCI/FU	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A
Use of non-renewable secondary fuels MJ PCI/FU	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A
Net use of fresh water resources m <sup>3</sup> /FU	6.25E-02	1.08E-03	3.33E-02	1.55E-03	1.79E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.55E-06	0.00E+00	2.42E-03	N/A

Waste categories	Fabrication stage			Installation stage		Use stage							End of Life stage				D Benefits and impacts beyond the system limits
	A1 Raw material supply	A2 Transport	A3 Fabrication	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Use of energy	B7 Use of water	C1 Deconstruction/ demolition	C2 Transport	C3 Waste treatment	C4 Elimination	
Hazardous waste disposed kg/FU	4.90E-02	2.42E-03	3.42E-02	3.53E-03	1.26E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.04E-05	0.00E+00	1.68E-03	N/A
Non-hazardous waste disposed kg/FU	5.35E-01	2.52E-01	2.18E-01	3.75E-01	6.76E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-03	0.00E+00	8.35E+00	N/A
Radioactive waste disposed kg/FU	1.39E-03	3.43E-05	1.13E-04	4.92E-05	3.25E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.45E-07	0.00E+00	1.38E-05	N/A

Output flows		Fabrication stage			Installation stage		Use stage							End of Life stage				D Benefits and impacts beyond the system limits	
		A1 Raw material supply	A2 Transport	A3 Fabrication	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Use of energy	B7 Use of water	C1 Deconstruction/ demolition	C2 Transport	C3 Waste treatment	C4 Elimination		
Components for re-use kg/FU		0.00E+00	0.00E+00	1.83E-02	0.00E+00	1.93E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A
Materials for recycling kg/FU		0.00E+00	0.00E+00	1.03E-01	0.00E+00	1.02E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A
Materials for energy recovery kg/FU		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A
Exported energy MJ/FU	Electricity	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A
	Vapor	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A
	Gas	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A

Impact category/flow	Unit	Total Fabrication	Total Installation	Total Use	Total End of Life	Total Life cycle
Global Warming Potential (GWP)	kg CO <sub>2</sub> eq/FU	4.88E+00	3.30E+00	0.00E+00	9.56E-01	9.13E+00
Depletion potential of the stratospheric ozone layer, (ODP)	kg CFC 11 eq/FU	2.68E-06	6.92E-07	0.00E+00	2.33E-08	3.40E-06
Acidification Potential of soil and water (AP)	kg SO <sub>2</sub> eq/FU	3.05E-02	9.39E-03	0.00E+00	1.13E-03	4.11E-02
Eutrophication Potential (EP)	kg (PO <sub>4</sub> ) <sup>3-</sup> eq/FU	3.41E-03	1.23E-03	0.00E+00	5.21E-04	5.15E-03
Formation potential of tropospheric ozone (POCP)	Ethene eq/FU	5.17E-03	1.30E-03	0.00E+00	2.61E-04	6.73E-03
Abiotic depletion potential – non-fossil (ADP-elements)	kg Sb eq/FU	2.43E-05	3.45E-05	0.00E+00	1.32E-07	5.90E-05
Abiotic depletion potential – fossil (ADP-fossil fuels)	MJ PCI/FU	2.55E+02	5.86E+01	0.00E+00	2.16E+00	3.15E+02
Water Pollution	m <sup>3</sup> /FU	5.78E+00	1.50E+00	0.00E+00	1.03E-01	7.39E+00
Air Pollution	m <sup>3</sup> /FU	1.02E+03	2.68E+02	0.00E+00	1.46E+01	1.30E+03
Use of renewable primary energy excluding the renewable primary energy resources used as raw materials	MJ PCI/FU	6.16E+00	1.37E+00	0.00E+00	7.46E-02	7.61E+00
Use of renewable primary energy resources used as raw materials	MJ PCI/FU	3.50E+00	-9.19E-01	0.00E+00	0.00E+00	2.58E+00
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ PCI/FU	9.67E+00	4.48E-01	0.00E+00	7.46E-02	1.02E+01
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ PCI/FU	9.39E+01	4.24E+01	0.00E+00	2.28E+00	1.38E+02
Use of non-renewable primary energy resources used as raw materials	MJ PCI/FU	1.76E+02	1.84E+01	0.00E+00	0.00E+00	1.94E+02
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ PCI/FU	2.70E+02	6.08E+01	0.00E+00	2.28E+00	3.33E+02
Use of secondary materials	kg/FU	5.43E-02	5.72E-03	0.00E+00	0.00E+00	6.00E-02
Use of renewable secondary fuels	MJ PCI/FU	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	MJ PCI/FU	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water resources	m <sup>3</sup> /FU	9.69E-02	1.95E-02	0.00E+00	2.43E-03	1.19E-01
Hazardous waste disposed	kg/FU	8.57E-02	1.29E-01	0.00E+00	1.69E-03	2.17E-01
Non-hazardous waste disposed	kg/FU	1.01E+00	1.05E+00	0.00E+00	8.35E+00	1.04E+01
Radioactive waste disposed	kg/FU	1.54E-03	3.74E-04	0.00E+00	1.39E-05	1.93E-03
Components for re-use	kg/FU	1.83E-02	1.93E-03	0.00E+00	0.00E+00	2.02E-02
Materials for recycling	kg/FU	1.03E-01	1.02E-01	0.00E+00	0.00E+00	2.05E-01
Materials for energy recovery	kg/FU	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy (electricity)	MJ/FU	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy (vapor)	MJ/FU	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy (gas)	MJ/FU	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00



## 7 ADDITIONAL INFORMATION ABOUT THE EMISSION OF DANGEROUS SUBSTANCES IN THE INTERIOR AIR, SOIL AND WATER DURING THE USE STAGE

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### 7.1 Interior air

#### **VOC and formaldehyde emissions**

These products are not in contact with the interior air, and therefore have no impact on the sanitary quality of interior spaces.

#### **Anti-fungal and bacterial behavior**

No tests concerning anti-fungal and bacterial properties have been performed for the products included in this declaration.

#### **Construction product natural radioactive emissions**

No tests concerning the natural radioactive emissions have been performed for the products included in this declaration.

#### **Fiber and particle emissions**

No tests concerning the emission of fibers or particles have been performed for the products included in this declaration.

### 7.2 Soil and water

No tests concerning the emission of substances in the run-off water have been performed for the products included in this declaration. The products are not in contact with drinking water but may be in contact with rain water.

## 8 PRODUCT CONTRIBUTION TO THE QUALITY OF LIFE IN AN INDOOR ENVIRONMENT

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#### **Product characteristics contributing to the hygro-thermic comfort of the building:**

The products do not have a significant impact on the hygro-thermic comfort of the building, however the RT2012 (Th-U fascicule 2/5) does provide a typical thermal conductivity for bituminous sheets of  $\lambda = 0.23 \text{ W/m} \cdot \text{k}^{-1}$ .

#### **Product characteristics contributing to the acoustic comfort of the building:**

The products do not contribute to the acoustic comfort of the building.

#### **Product characteristics contributing to the visual comfort of the building:**

The products do not contribute to the visual comfort of the building.

#### **Product characteristics contributing to the olfactory comfort of the building:**

The products do not contribute to the olfactory comfort of the building.